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Does culture matter social distancing under the COVID-19 pandemic?

Toan Luu Duc Huynh

University of Economics Ho Chi Minh City, Viet Nam



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ABSTRACT

This paper is the first to examine the role of the cultural dimension in practising social distancing across the world. By drawing the data from the Google COVID-19 community mobility reports and the Hofstede cultural factors for 58 countries over the period from 16 February to 29 March 2020, we find that countries with higher 'Uncertainty Avoidance Index' predict the lower proportion of people gathering in public such as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces. However, we do not find any predictive factor in having a relationship with the percentage of citizens staying in their residential areas. Our results are robust by adding the control variable as the wealth status, GDP per capita. Hence, this paper suggests some effective communications to contain the COVID-19 pandemic by emphasizing the role of uncertainties.

1. Introduction

With the COVID-19 pandemic threatening millions of lives, changing our behaviours to prevent the spread of the disease is crucial and timely action; mainly practising social distancing. Compared to the seasonal flu, this deadly virus exhibits nearly twice as contagious because the double in the median reproductive index (R_0 , seasonal flu was 1.28 while this R_0 for coronavirus is 2.2) (Biggerstaff et al., 2014; Li et al., 2020). It implies that the average person with flu virus will cause the infection to one other person whereas having coronavirus; he could infect about two different people. In addition, the COVID-19 also has a longer incubation; therefore, people could affect to the other without their intentions. To be more detail, the seasonal flu takes two days to have apparent symptoms; however, the extant medical evidence shows that the incubation period for COVID-19 is up to two weeks (Li et al., 2020). Therefore, this challenges the health policies to contain this virus. The outbreak of coronavirus is causing the worst health crisis because the heavy pressure on the healthcare system exists, which was potentially predicted that tens of millions people might die (Ferguson et al., 2020). Therefore, the recent study of Anderson et al. (2020) emphasized that the only thing that human can do to stop the COVID-19 outbreak is to change their behaviours. Once again, "individual behavior will be crucial to control the spread of COVID-19" (Anderson et al., 2020). Accordingly, many suggestions are raised, such as washing hands more frequently and for longer, avoiding public gatherings, cancelling travel plans, and keeping a distance from others. Although the efficiency of these actions is not well examined from academic and

scientific evidence until now, these recommendations tend to be applicable for many countries to execute at present.

Even this is the global pandemic; each country has its response. For example, Vietnam, Japan, Taiwan, and the other Asian countries chose to lock down the national economy as well as applied the strict quarantine at the beginning of the outbreak stage. In contrast, the United States is likely to overlook this pandemic severity.¹ One of the potential concerns might arise from cultural differences across these countries because people might have different perception and viewpoint regarding the COVID-19 outbreaks.

This paper is the first study to examine the global scope data from Google COVID-19 community mobility reports, which allows seeing the changes in the percentage of people gathering in different areas such as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces in comparison with the median value of baseline day (16 February 2020). In addition, using the cultural dimension from Hofstede (2001) study is our main predictive factor to examine the differences in human behaviours across the world. Our main contribution is to indicate the role of cultural factor in driving the global social distancing activities under the COVID-19 pandemic.

We find that only one factor matters most. This is the 'Uncertainty Avoidance Index' (UAI). The higher avoidance in uncertainty, the lower gathering in public. Our results are robust by different regression models as well as the control of wealth status. However, we do not find any supporting evidence that cultural factors would predict the proportion of people who are staying in the home to practice social distancing. Our results will suggest several health implications to the

E-mail address: toanhld@ueh.edu.vn.

¹ See more on <https://time.com/5805683/trump-administration-coronavirus/>

authorities by framing people about ‘Uncertainty Avoidance’ feature to encourage people mitigating social gathering.

The remainder of the paper is organized as follows. Section 2 will acknowledge the related literature about how social distancing works and the role of cultural factors in human behaviours under pandemic. Section 3 describes our data collection, data processing, and descriptive statistics. Before giving our conclusions and discussion in Section 5. Section 4 summarizes our main findings and results.

2. Related literature review

2.1. How social distancing works

To begin with, Mahtani et al. (2020) provided a rapid summary of the evidence for social distancing during global pandemics. This systematic study also emphasizes that the timing and duration of such measures are quite essential to contain the disease outbreaks. Also, the strategy in staggering and implementing cumulative interventions might prove most effective in the previous pandemic such as influenza pandemics. Therefore, what people did in the previous outbreaks might be helpful in the COVID-19 tough time. Fong et al. (2020), Rashid et al. (2015) indicated the effectiveness of six measures to reduce community influenza transmission through a policy review of social distancing practices such as isolating ill people, tracing contacts, quarantine of exposed persons, school dismissals or closures, changes in the workplace, and avoiding crowds and restricting movement. At present, many countries are following to shut down the educational system, performing the national lockdown, and forcing their citizens to stay at home.

The empirical studies have indicated the efficiency of social distancing. In particular, Remuzzi and Remuzzi (2020) alerted that the European countries should avoid close contact at the individual level and social meetings in each country. This is the only effective way to contain the spread of this virus. In the same vein, there might be 1.76 million people who would be saved their lives if the United States practicing social distancing (Greenstone and Nigam, 2020). However, Greenstone and Nigam (2020) also concerned the cost-benefit analysis of social distancing when applying in the enforced ways. However, in reality, each country has its own way to implement social distancing. For instance, the Russian is using the financial penalty for those who do not follow the instructions. The Philippines and India are the typical examples to arrest those who violate the social distancing practices. Instead of using strict regulation, some countries are using the media tools to disseminate their policies to ‘nudge’ people to perform social distancing.

Interestingly, Lunn et al. (2020) used the experiments to investigate how to motivate social distancing in Ireland. This study found that the thought of infecting vulnerable people or large numbers of people could encourage social distancing by using a sample of 500 respondents. This is one of the critical findings to indicate that human behaviour can change if we understand the participants’ judgements about this deadly virus. Meanwhile, Lerner et al. (2015) asserted that the rational information process, not emotional responses, despite the evidence, mainly drives human behaviours. However, the understandings of this virus as well as risk perception about the current pandemic are quite ambiguous and not the same to every country. Thus, the actions by the government are quite different over the foremost period. It implies that this might be cultural differences in their decision-making across countries, which we would like to examine this study.

2.2. Culture and human behaviors under the pandemic

When it comes to the theoretical framework for culture and social distancing, we would like to acknowledge the cultural psychology, which identifies the likelihood of human behaviors on the societal values under the COVID-19 pandemic. It is undeniable that human’s

Table 1

Summary of descriptive statistics.

Variable	Mean	Std. Dev.	1% Percentile	99% Percentile
Retail	−66.43	21.02	−94	−9
Grocery	−41.43	23.37	−92	11
Parks	−41.26	33.86	−90	51
Stations	−64.16	15.10	−88	−17
Workplace	−38.81	15.33	−64	−1
Residential	16.10	6.41	4	31
PDI	57.36	20.44	11	104
IDV	46.62	24.08	12	91
UAI	66.81	22.87	8	112

Notes: The negative values in retail, grocery, parks, stations, workplaces stand for the decrease in percentage compared to the median value of baseline. In contrast, the residential shows the opposite direction, implying the increase in percentage when people are staying at home. The number of observations is 58 countries.

behaviors are mainly based on what they perceive others in the community are doing or approve/disapprove of (Cialdini and Goldstein, 2004). Therefore, the roles of culture as well as social norms heterogeneously drive human behaviors. For instance, while the Asian countries have applied the strict and punishable rules on social distancing as the tight cultures, the European countries are likely to be loose culture in recommending people to stay at home (Gelfand et al., 2011). The previous studies such as Harrington and Gelfand (2014), Gelfand et al. (2011) indicate that the tight culture is associated with natural disasters, invasions, population density, and pathogen outbreaks. Therefore, these countries will form the group to coordinate as well as collaborate to keep people together during a crisis. In contrast, the loose culture will prioritize the privacy as well as freedom of each individualism. From this perspective, this has a partial connection with the cultural dimension in Hofstede (2001) that people coming from individualism countries are not likely to commit the social distancing as the governmental suggestions. To sum up, people have to tradeoffs between their freedom and constraints from the different viewpoints across societies when doing social distancing (Gelfand, 2019).

One cultural aspect influencing the human behavior is political polarization. Some countries might think that the popularization of information seems to cause lower political trust (Hetherington and Weiler, 2009). Therefore, people in these societies might believe in the misleading information, which induces the wrong decision-making in the pandemic period (Van Bavel and Pereira, 2018). Thus, the political opinion will gradually transmit to the human behavior through one of cultural dimensions, particularly as Masculinity Versus Femininity and in Power Distancing Index of the Hofstede measurements.

Lastly, the human decision-making during a pandemic involves uncertainty because people tend to avoid the uncertainties if they perceived higher risk (Huynh, 2020). In addition, those who are risk-averse might commit to social distancing. Furthermore, the extant literature shows that human behaviors might be affected by the others by comparing to themselves (for example, Atanasov et al., 2013; Garcia-Retamero and Galesic, 2012). Hence, looking at the uncertainty dimension might offer us how people react in terms of the uncertain situations regarding the COVID-19 outbreaks.

Recently, the study of Caria et al. (2020) indicated that there is heterogeneous behaviors among 51 countries in terms of social distancing. According to this study, Peru is the country, which exhibits the highest number of people choosing ‘I stayed at home for the past week’. Interestingly, our dataset from Google also confirms that Peru ranked the second in the countries who have the highest percentage increase in residential. The Caria et al. (2020) study is one of the international surveys to investigate the human behaviors as well as their belief in terms of following the social distancing under the COVID-19 outbreaks. In the light of how people behave the social distancing, Broniec et al. (2020) explain that social distancing can keep flattening the infected

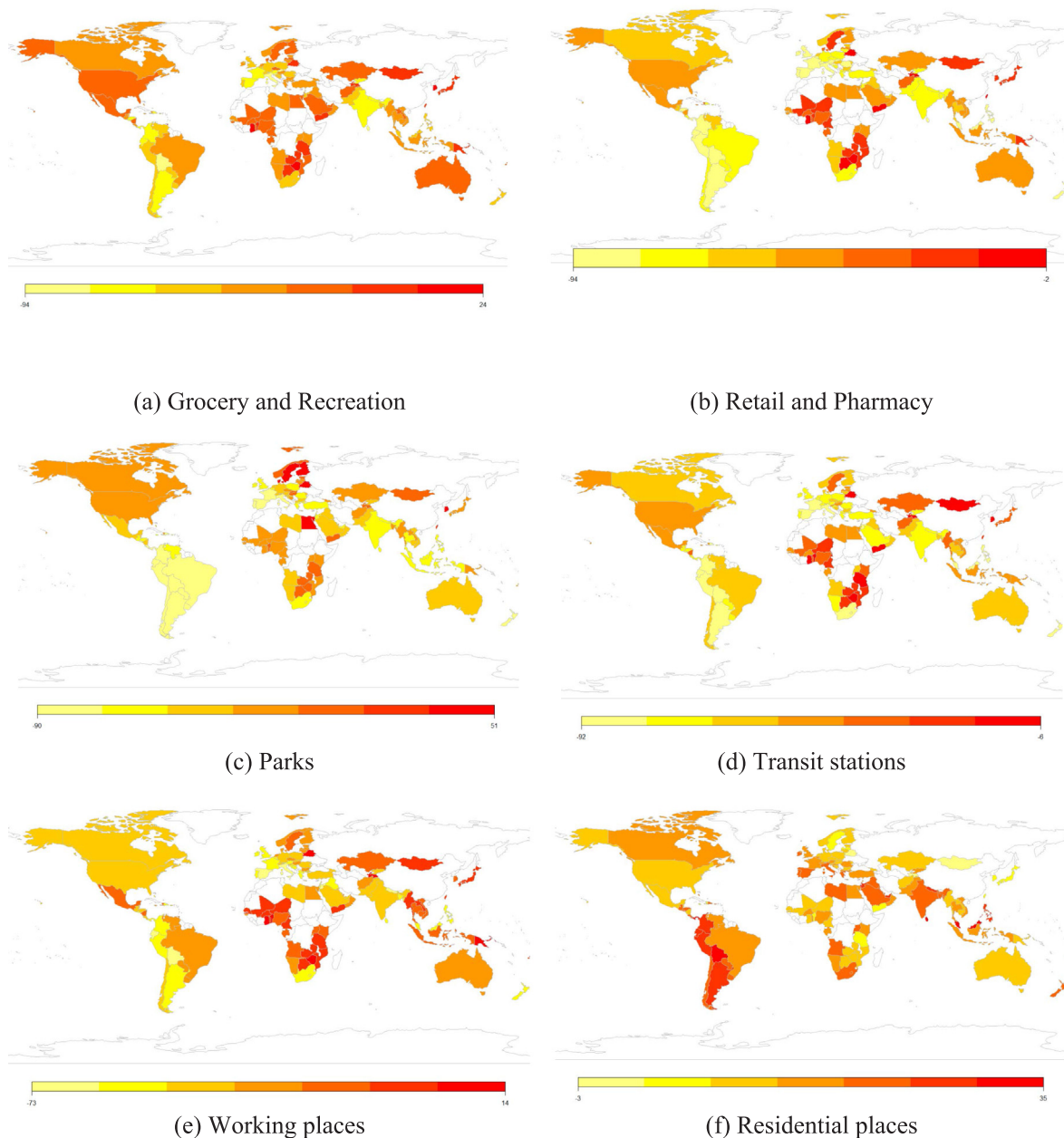


Fig. 1. The visualization of human behaviors in social distancing based on the Google data.

curve, which helps to remain the number of infection cases within the range of the healthcare capacity. Thus, using the cultural factors to examine their roles on encouraging the social distancing is crucial at that time. Therefore, we acknowledged the theoretical background that how cultures and social norms might matter to social distancing. However, this is the first empirical study, which investigates this relationship in-depth.

3. Data and descriptive statistics

3.1. Data collection

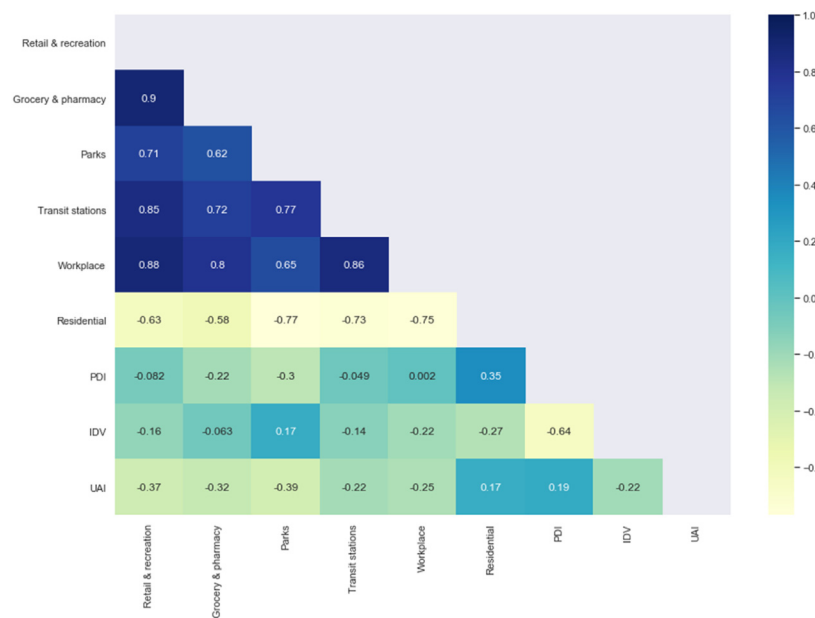
3.1.1. Social distancing data

We used the data provided by Google to observe the level of social distancing taking place in various locations such as retail and recreation, grocery and pharmacy, parks, transit stations, workplaces, and residential. These data are the anonymous locations to track back

several weeks over the changes across 131 countries and individual counties across the world. This data represents the aggregation numbers instead of individual-level; therefore, it does not show the absolute values of how many people are staying in specific areas. However, these data exhibit the percentage changes, implying the potential surges in attendance, compared to the median value of baseline time, specifically February 16, 2020. Our data were retrieved on March 29, 2020. Hence, these numbers explain how the trends vary over 13 days in different countries. For instance, if the number of 'retail and recreation' means -52% . It means that Vietnam has seen a 52% drop in retail and recreation. Moreover, the positive value implies the opposite direction; for example, the 'residential' in Italy is 24, referring to a 24% increase in residential population over the period from February 16 to 29 March 2020.

3.1.2. Hofstede cultural dimensions

The following data that we use in our estimates are cultural



Notes: PDI, IDV, and UAI stand for Power Distancing Index, Individualism Versus Collectivism, Uncertainty Avoidance Index, respectively.

Fig. 2. Correlation among Google 'social distancing' data and cultural dimensions. **Notes:** PDI, IDV, and UAI stand for Power Distancing Index, Individualism Versus Collectivism, Uncertainty Avoidance Index, respectively.

Table 2

Factor analysis by Principal-Component Factor.

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	4.10958	3.65849	0.8219	0.8219
Factor2	0.45109	0.18898	0.0902	0.9121
Factor3	0.26211	0.15135	0.0524	0.9646
Factor4	0.11076	0.04431	0.0222	0.9867
Factor5	0.06645	.	0.0133	1

Notes: This method chooses the option of minimum value of eigenvalues to be retained. The number of observation is 58 and number of parameter is 5. Independent versus saturated has $\chi^2(10) = 312.65$.

Table 3

Rotated factor loadings (pattern matrix) and unique variances.

Variable	Social distancing	Uniqueness
Retail	0.9607	0.0771
Grocery	0.8937	0.2013
Parks	0.819	0.3293
Stations	0.9261	0.1424
Workplace	0.9272	0.1404

Notes: Kaiser-Meyer-Olkin measure of sampling adequacy (overall) equals 0.8348

dimensions from the extended version of Hofstede (2001) in 2015. Therefore, we have three main dimensions to capture the social distancing of people across the world. In particular, we use four main cultural dimensions that are relevant to social distancing.

- **Power Distancing Index (PDI):** This index demonstrates the measurement of how acceptable that society has the hierarchy of power and wealth among the general population of a nation, cultural, or business. The higher value stands for a strong hierarchy.
- **Individualism Versus Collectivism (IDV):** This index captures the degree to which the community reinforces individual or collective achievement. People in the individualism society are expected to be

different as individual as compared to loyal affiliation to a life-long in-group (for example, extended family, friend, etc.). The opposite side is collectivism.

- **Uncertainty Avoidance Index (UAI):** This element represents that society is afraid of uncertain, unknown and unstructured situations. Hence, this proxy can capture cultural perception in an ambiguous context in decision-making.

3.1.3. Descriptive results

Table 1 presents a summary of descriptive statistics among our variables. Overall, people around the world tend to reduce their gathering in the transit stations; for example, the airport and the retail area over the last 13 days. To our great surprise, the workplace is the place where people are less likely to reduce their working gathering, although many governments are calling for working from home. Parks and grocery places have similar patterns in mitigating human interactions. Noticeably, there is one country, which experiences an increase in gathering people in parks and grocery. It is the South of Korea when this authority is performing the mass testing in the public community. In addition, the South Korea is the typical example that flattened its coronavirus curve and people tend to come back their normal lives with keeping the distance at least two meters. Interesting, the lowest value in staying a residential place is Taiwan. At present, Taiwan is likely to control the current situation.

As the beginning, we have 131 countries and regions observations in the Google social distancing indices, which is illustrated in Fig. 1. After matching with Hofstede indices, we have the total 58 observations for further estimations. In addition, to compare the differences across the continents, we also match each country with each region such as the Asian, Europe, Latin America, as well as Oceania and Australia to examine the differences across the continents to consider whether we should put as a control variable or not.

Table 4
Country-level OLS regression for the efficiency of social distancing.

Variables	Dependent variable: Social distancing							
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
PDI	−0.007 [−1.208]	−0.003 [−0.444]					−0.015 [−1.924]	−0.010 [−1.310]
IDV			−0.004 [−0.692]	−0.007 [−0.919]			−0.015* [−2.224]	−0.015 [−1.686]
UAI					−0.015** [−2.895]	−0.013* [−2.116]	−0.016** [−3.411]	−0.014* [−2.650]
Log (GDP/cap)		0.247 [1.324]		0.421 [1.952]		0.193 [1.290]		0.316 [1.692]
Costant	0.381 [1.051]	−2.501 [−1.185]	0.187 [0.585]	−4.112* [−2.129]	0.987** [2.739]	−1.272 [−0.753]	2.627** [3.519]	−1.183 [−0.663]
R-squared	1.84	4.68	0.9	6.5	11.4	12.7	19.91	18.9
Observations	58	50	58	50	58	50	58	50
Multicollinearity	No	No	No	No	No	No	No	No

Notes: * < 0.05, ** < 0.01, *** < 0.001. The robust standard errors are in brackets. PDI, IDV, and UAI stand for Power Distancing Index, Individualism Versus Collectivism, Uncertainty Avoidance Index, respectively.

Table 5
Country-level OLS regression for the percentage of staying at residential area.

Variables	Dependent variable: Residential							
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
PDI	0.110* [2.567]	0.078 [1.434]					0.092 [1.445]	0.052 [0.819]
IDV			−0.072* [−2.162]	−0.074 [−1.606]			−0.016 [−0.354]	−0.045 [−0.873]
UAI					0.048 [1.398]	0.019 [0.514]	0.029 [0.919]	0.010 [0.284]
Log (GDP/cap)		−2.049 [−1.623]		−1.807 [−1.346]		−2.993** [−2.709]		−1.533 [−1.117]
Costant	9.816** [4.005]	33.333* [2.216]	19.443** [9.917]	38.868** [3.123]	12.920** [5.216]	46.265** [3.772]	9.671* [1.935]	30.992* [2.046]
R-squared	12.21	16.74	7.2	16.5	2.9	12.1	13.6	18.2
Observations	58	50	58	50	58	50	58	50
Multicollinearity	No	No	No	No	No	No	No	No

Notes: * < 0.05, ** < 0.01, *** < 0.001. The robust standard errors are in brackets. PDI, IDV, and UAI stand for Power Distancing Index, Individualism Versus Collectivism, Uncertainty Avoidance Index, respectively.

4. Main findings

4.1. Correlation matrix

Fig. 2 represents the correlation matrix among our main variables. First, it is very intuitive to observe that the numbers of social distancing proxies highly correlated. Meanwhile the lower gathering percent in workplace, the higher percent in residential areas. It implies that the work from home might be effective because people can increase their likelihood to stay at home. Second, when looking at the cultural dimensions, Uncertainty Avoidance Index exhibits the negative correlation with the majority of social distancing index, except residential. It means that people coming from the countries with ‘risk-adverse’ tend to reduce their frequency to go the public (negative values) and stay more at home (0.17). Noticeably, citizens from high individualism country are likely to come to the parks more frequency (0.17) instead of having a decrease in this percentage numbers.

4.2. Explanatory factor analysis

Because the five factor such as in retail, grocery, parks, stations, workplaces stand for the decrease in percentage compared to the median value of baseline. This number also represents the human behaviors in the outdoor activities. Thus, we perform the explanatory factor analysis to construct one proxy from these data, which is

representative to the outdoor social distancing (see Table 2).

Table 1 demonstrates the number of factor that satisfies the Eigen value. Accordingly, there should have one factor generated with the explanatory of variance is 82.19%. Table 3 summarizes the proportion that each variable contributing to the ‘social distancing’ variable.

By checking correlation with ‘residential’ - the increasing percentage of people who stay at home, the correlated value is −0.7587 ($p < 0.01$). If people are not likely to gather in the public, implying the decrease in the percentage of ‘social distancing’, the proportion in residential areas would rise accordingly.

4.3. Regression results

Before performing the regression to examine the relationship between the cultural dimensions and the efficiency of social distancing, we executed the one-way Analysis of variance and covariance (ANOVA) to see whether the difference in social distancing across the continents. Our results suggest that significant (at the 10% level) differences among the four continents with F-statistics (2.28, $df = 3$). In addition, the ANOVA test for residential effect has F-statistics (2.14, $df = 3$) is insignificant. Thus, it implies that the geographical effect does not apply in the social distancing. We decided to not add this factor as our control variable. However, the use of GDP per capita as control variable is applied in many cultural economics studies including Getzner (2002), Dieckmann (1996). Hence, in our regression, we performed two

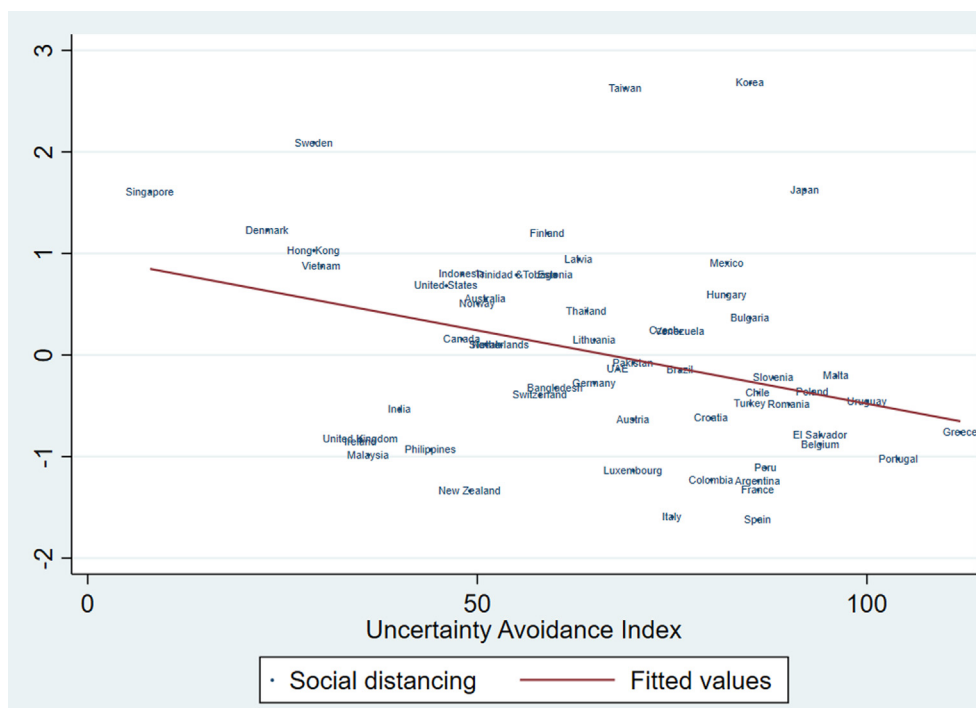


Fig. 3. Uncertainty Avoidance Index and changes in proportion of social distancing at the public.

estimates including with-and-without the natural logarithm of GDP per capita to assure the robust of our conclusions.

Table 4 summarizes our main findings how the cultural factors can influence the efficiency of social distancing, captured by the changing proportion of people in the outdoor activities over the period from February 16 to 29 March 2020. The robust coefficients appear in the proxy of Uncertainty Avoidance Index across four regression models. The negative coefficients are consistent to our expectations. It means that people coming from higher uncertainty avoidance index would decrease their likelihood in joining in the outdoor activities in this period. Our finding also confirms the theoretical framework that ‘risk-averse’ citizens would do social distancing by not going to grocery, pharmacy, workplace, or parks. Kappes et al. (2018) emphasized that human behaviors will change when they perceive the possibility to transmit risk to others. For instance, when co-workers think that their decision to go to work might risk infecting the elderly colleagues, suffering a serious illness, they might stay at home. Concomitantly, Andreoni and Bernheim (2009) offer another perspective that the British and American are unlikely to stay at home to work if they think that the risk of illness transmission is uncertain. These theoretical frameworks also explain why people coming from the higher uncertainty avoidance index tend to avoid the activities in the public in our study. The sole explanatory of Uncertainty Avoidance Index on social distancing is 11.4% while the combination with the other determinants improve the explanation up to 19.91%.

Table 5 chronologically presents the different regressions how the cultural dimensions could predict the proportion of people staying at residential area. To our great surprise, three cultural factors could not predict the changes in residential areas over last 13 days. It means that cultural factors could not explain why people choose to stay at home. However, the uncertainty avoidance index plays a predictive role on explain why citizens coming from high risk-averse countries avoid gathering. Our results are robust when controlling the wealth status.

Fig. 3 demonstrates the relationship between the Uncertainty Avoidance Index and changes in proportion of social distancing at the public. Overall, the European countries have the higher uncertainty avoidance. In addition, over last 13 days, the government well applied

the lockdown to compulsorily request people to stay at home as social distancing. Interestingly, the northern European such as Finland, Sweden, and Norway are unlikely to commit social distancing since these countries have lower uncertainty avoidance indices.

5. Conclusion and discussion

Currently, the best advice from public health authorities are sending the prominent messages that in order to contain the coronavirus pandemic, people must take their actions to change their behavior. One of the important behaviors is ‘social distancing’. This is the first country-level research to examine the role of cultural factors on driving the efficiency of social distancing by using two dataset such as the Google trackback and the extended Hofstede (2001). In reality, the human behaviors about social distancing are heterogeneous across the countries. Currently, the world needs to obtain the systematic actions from many countries and regions to ask people to perform the social distancing as the forced legitimation. However, people are allowed to go to grocery, pharmacy, transit stations, or parks, and so forth, as their necessity needs. This also has the potential risks to infect and to be infected. Thus, this study found that the country with higher ‘Uncertainty Avoidance Index’ from the Hofstede (2001) dimension has less proportion in gathering at these abovementioned public areas. However, we do not find any evidence to explain the changes in the proportion of people staying at residential places.

Our study also confirms the finding from Borg (2014) and Gaygisiz et al. (2017) that the cultural determinants play an important role in controlling infection behavior. Our suggestions are to embed core cultural values relevant to potential threats when going to the public to nudge people to avoid the social gathering under the COVID-19 pandemics. This is understandable to let people understand that they might have potential incubation period to infect to the others. In addition, this should be taken into account when interacting with the strangers in the public might increase the risky likelihood to get the coronavirus. Our study provides an evidence that public health strategies and interventions should be immediately taken actions to reduce the social gathering by ‘uncertainty avoidance’ factor.

Our study has been analyzed much more rapidly from preliminary evaluation than would be standard for research of this type. Therefore the further research about the cultural factors and the efficiency of social distancing need to be examined to draw more conclusions to the health authorities to the pandemics.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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